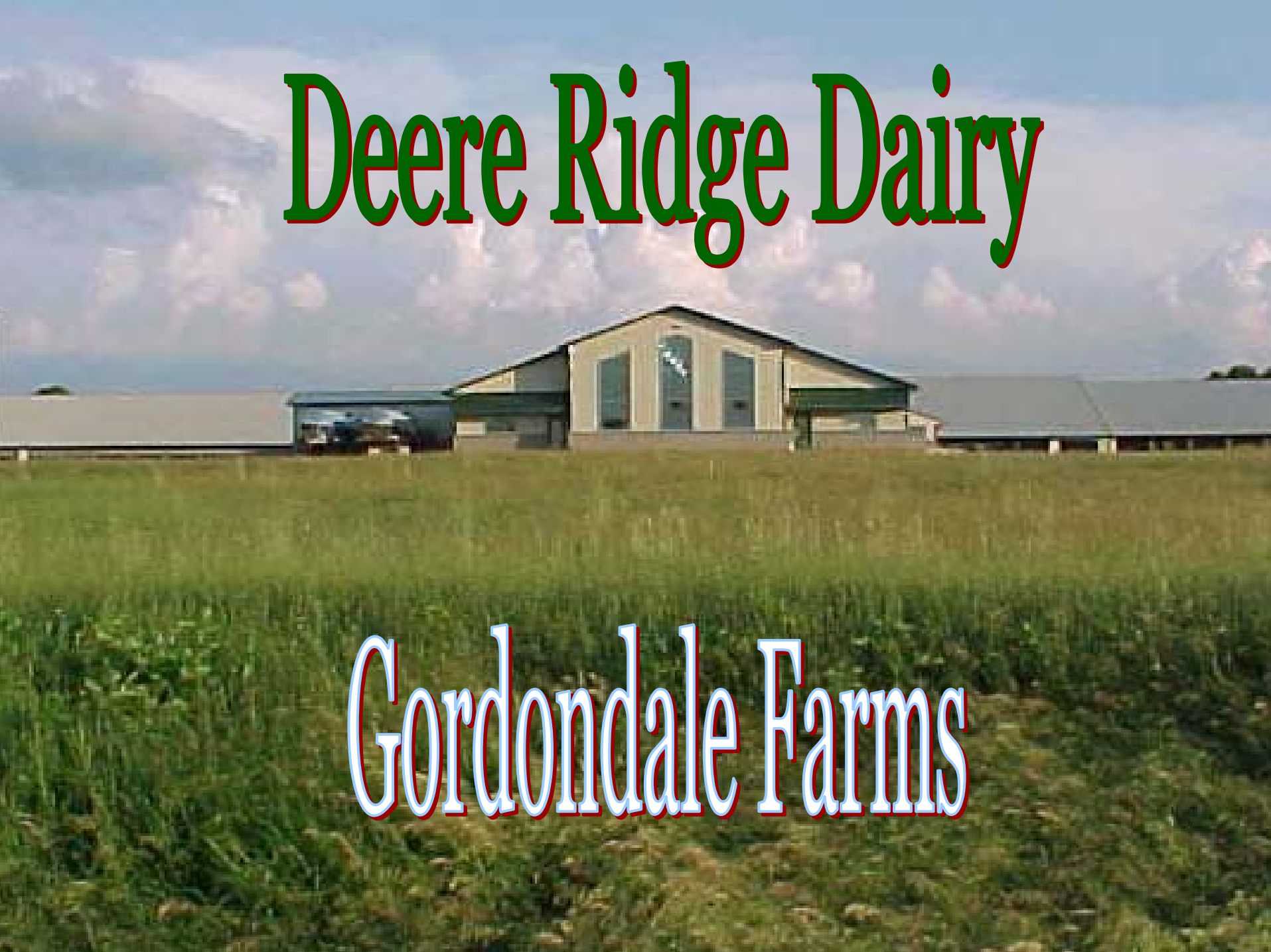

Deere Ridge Dairy
Gordondale Farms

Kyle Gordon

- Digestion
- Gas Production
- Fiber Separation
- Electricity Generation

Rear View:
Fiber Bins/Radiator

Digestion Pit

- Double 14: Expandable 22
- Rapid Exit
- Deck Flush
- Over Subway

Variable Response Vacuum Heat Pumps and Controls

Hospital Area

Management Center

- ✓Individual Cow Production
- ✓Somatic Cell – cow Activity

Feeding Alley – Terrazzo Tile

Breeding Pen Head Locks

Scrap in – beginning of Flush Flume

Digestion Pit

Gas Flare – Gas Conditioner

14 Foot Walls

Rerod Bird Cage

Weir Wall – Spill Over
Clean Out Access

Span Crete – Hard Cover Choice

Insulation: Gas Tight

Manure Injection

Gas Agitation

Heat Circulation

Heat Storage

Gas Accumulation and Fuel Blower

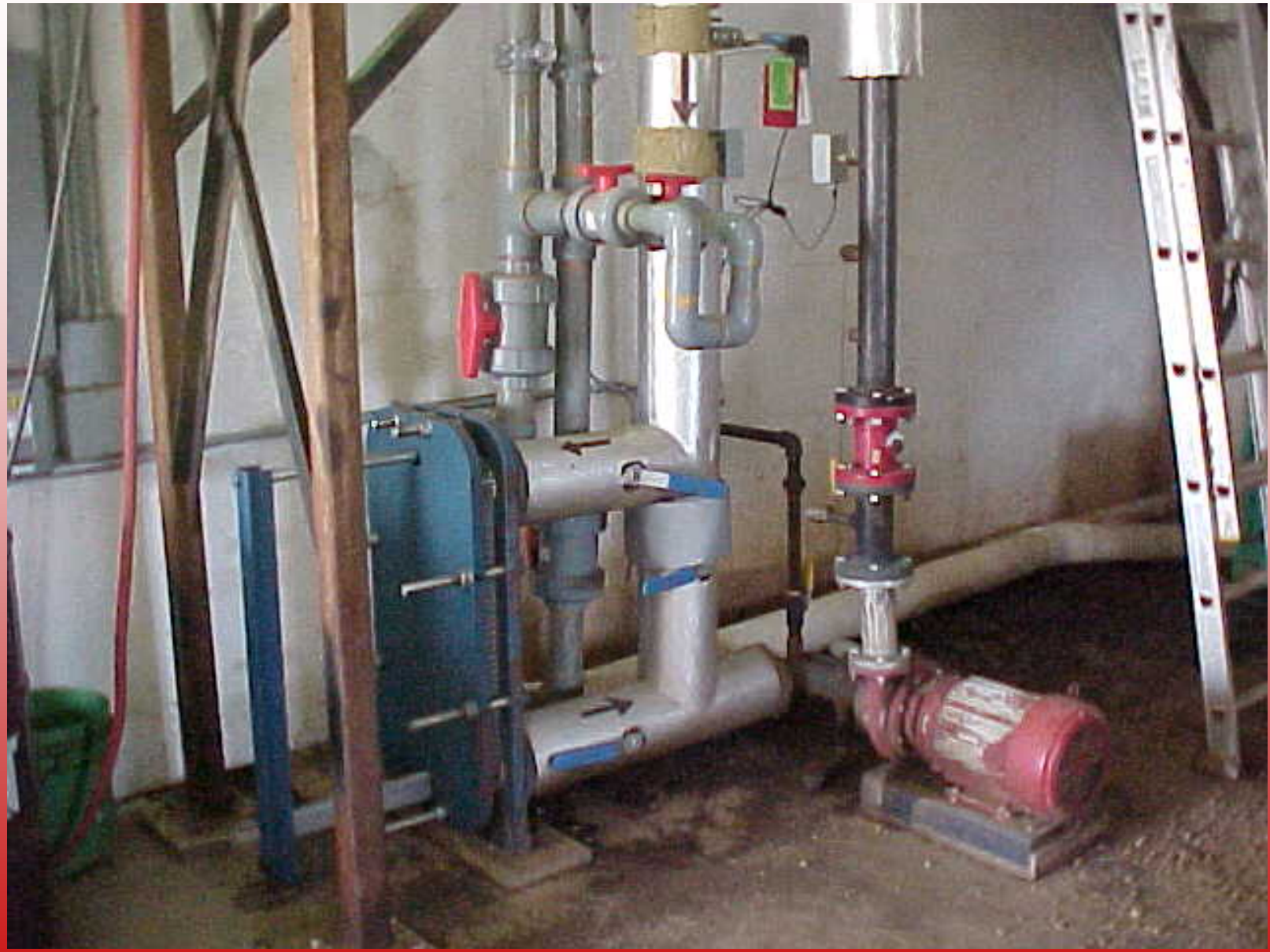
Fiber Separation **Auger Transfer**

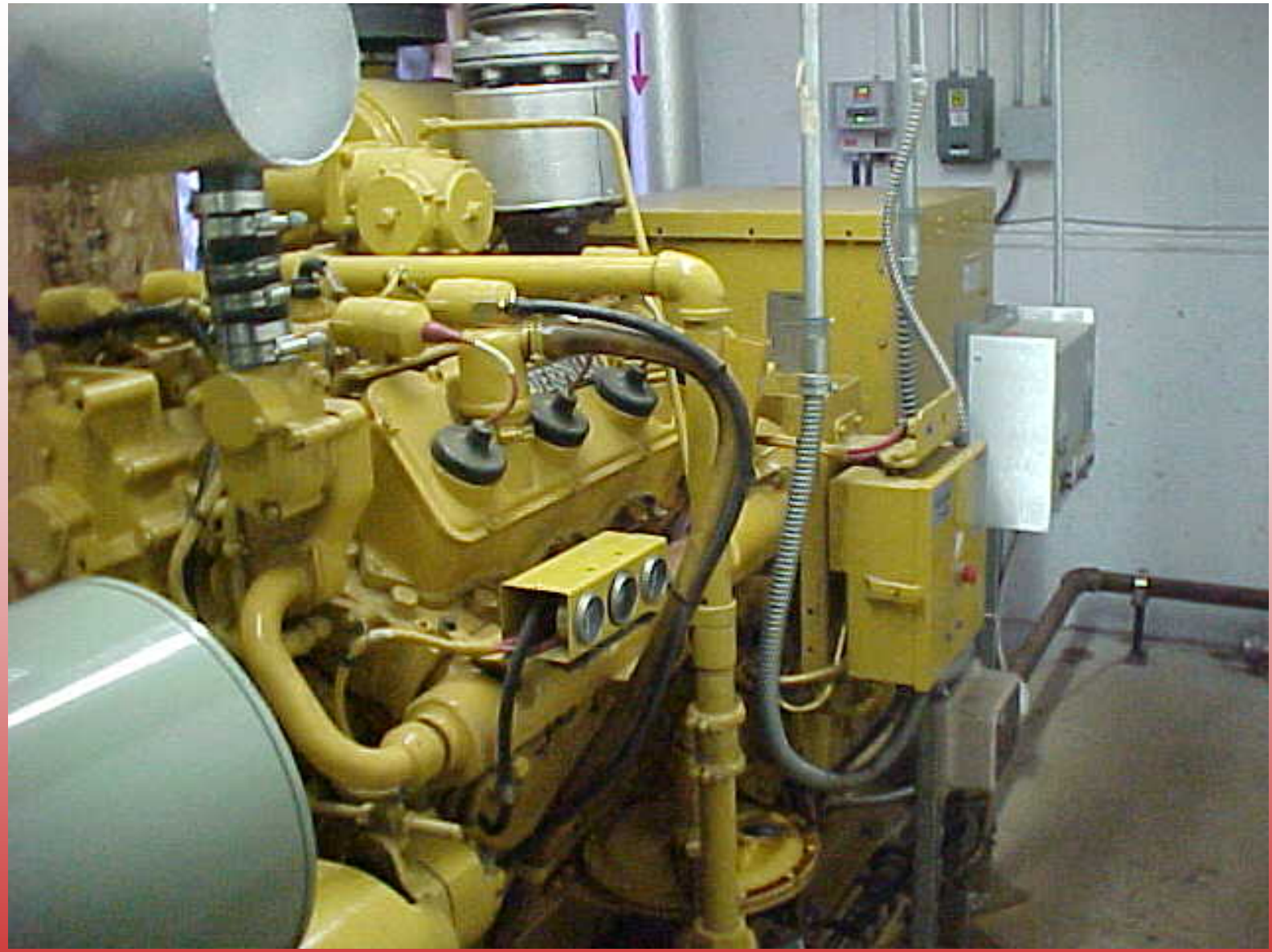
Fiber Auger and Storage Bin

Dairy Heat Exchange


CONTROLS
MAR 26 2006

Heat Exchanger Collection





Cat 340 HP Engine **150 KW Generator**

Noise Pollution Control

Heat Exchange

Electricity Generation Controls

BIOGAS SAMPLES	5/4/2004		5/18/2004		6/1/2004		6/15/2004		6/28/2004		7/13/2004		7/26/2004		8/11/2004	
	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2
Methane	51.2	56.4	51.2	56.1	48.6	54.6	45.5	55.0	54.4	36.6	54.6		56.9	51.8	54.5	55.5
Carbon Dioxide	41.8	42.9	40.3	42.6	38.8	42.6	36.6	42.3	42.8	31.1	43.0		42.6	42.0	43.9	43.3
Hydrogen Sulfide																
Ammonia																

DIGESTER READINGS	5/4/2004	5/18/2004	6/1/2004	6/15/2004	6/28/2004	7/13/2004	7/26/2004	8/11/2004
Biogas Generated (SCFM)	*	*	*	*	*	*	*	66.29
MWs	0.118	0.110	0.119	0.115	0.110	0.110	0.115	0.119
Engine Hours	18,024	18,363	18,694	18,999	19,334	19,668	237	613
Sludge Recirculation Pump	6,457	6,653	6,849	7,045	7,231	7,437	7,622	7,838

BTU FLOW METER	5/4/2004		5/18/2004		6/1/2004		6/15/2004		6/28/2004		7/13/2004		7/26/2004		8/11/2004	
	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
BTUs x 10,000 (Cumulative)	29,535	185,267	34,694	210,587	39,228	235,255	45,774	259,443	51,954	282,818	62,497	310,060	71,648	333,052	81,879	361,492
Gallons x 100 (Cumulative)	193,941	213,857	216,737	238,850	23,942	263,703	261,607	287,998	282,670	311,043	306,938	337,583	327,741	360,400	353,295	388,479
BTUs/Hr x 10,000	21.8	69.2	6.0	70.6	38.0	89.8	15.1	73.0	24.5	75.0	52.1	62.9	17.8	63.7	19.5	75.8
Gallons/Minute	115	122	113	123	114	127	112	123	111	125	113	118	113	122	114	127
Supply Temperature (F)	188	198	188	200	188	195	188	198	188	196	195	199	187	195	188	197
Return Temperature (F)	184	184	187	186	183	183	184	184	184	183	187	185	181	181	185	184

FLOW READINGS	5/4/2004	5/18/2004	6/1/2004	6/15/2004	6/28/2004	7/13/2004	7/26/2004	8/11/2004
Digester Influent[1] (Hrs.)	44.5	51.9	59.6	67.2	74.6	83.6	91.2	100.6
Digester Effluent (Hrs.)	Same as Above	Same as Above	Same as Above	Same as Above	Same as Above	Same as Above	Same as Above	Same as Above
Separated Liquids (10 hrs-M-F, 24-Sat&Sun)								
Separated Solids (10 hrs-M-F, 24-Sat&Sun)								

TIME OF READINGS	11:00 AM	12:15 PM	12:00 PM	1:30 PM	10:45 AM	11:45 AM	1:00 AM	11:00:00 AM

[1]Flow rate was calculated as 520.64 gal/min. Gale (715) 572-6222 NLS (800) 278-1254

* Gas meter was removed because it was restricting flow to engine.

Meter for readings not installed.

SAMPLING RESULTS
Ag Star Program
Gordondale Farms

FAN EFFLUENT (LIQUID)												
PARAMETERS	1/8/2004	1/22/2004	2/5/2004	2/26/2004	3/4/2004	3/22/2004 *	4/6/2004	4/20/2004	5/4/2004	5/18/2004	6/1/2004	6/15/2004
Ammonia Nitrogen (% DWB)	6.0	5.6	4.4	7.2	6.3	6.8	6.0	6.0	5.7	6.5	6.7	7.0
Total Kjeldahl Nitrogen (% DWB)	10	11	11	12	11	6.8	9.5	7.4	10.0	9.9	11.0	12.0
Total Phosphorous (%DWB)	1.3	1.3	1.2	1.3	1.5	1.4	1.3	1.3	1.4	1.4	1.5	1.6
Total Solids (%)	3.2	3.0	2.8	2.7	2.7	2.8	3.3	3.3	3.4	3.5	3.5	3.5
Total Volatile Solids (% DWB))	69	73	72	71	70	71	71	71	70	70	72	67

FAN EFFLUENT (SOLID)												
PARAMETERS	1/8/2004	1/22/2004	2/5/2004	2/26/2004	3/4/2004	3/22/2004 *	4/6/2004	4/20/2004	5/4/2004	5/18/2004	6/1/2004	6/15/2004
Ammonia Nitrogen (% DWB)	0.88	0.70	0.74	0.87	0.66	0.55	0.62	0.58	0.79	0.88	0.76	0.93
Total Kjeldahl Nitrogen (% DWB)	2.6	2.5	2.2	2.8	2.2	1.8	2.0	1.9	2.5	2.1	2.2	2.5
Total Phosphorous (%DWB)	0.84	0.79	0.76	0.81	0.81	0.64	0.74	0.63	0.90	0.83	0.85	1.10
Total Solids (%)	28.4	27.8	28.1	25.7	29.7	31.6	31.7	31.6	28.3	30.8	30.0	27.0
Total Volatile Solids (% DWB))	76	79	82	80	76	79	77	73	72	77	77	73

DWB = Dry Weight Basis
% DWB = (mg/kg DWB) / 10,000
* = Copper Sulfate upset of digester

DIGESTER INFLUENT												
PARAMETERS	1/8/2004	1/22/2004	2/5/2004	2/26/2004	3/4/2004	3/22/2004 *	4/6/2004	4/20/2004	5/4/2004	5/18/2004	6/1/2004	6/15/2004
Total Cemical Oxygen Demand (mg/L)	46,000	67,000	62,000	80,000	46,000	47,000	55,000	69,000	130,000	81,000	69,000	110,000
Soluble Chemical Oxygen Demand (mg/L)	8,300	2,800	8,700	5,800	5,600	5,300	8,100	5,000	6,700	8,300	17,000	6,300
Fecal Streptococcus (CFU/100 mL)	2,400,000	32,000,000	13,000,000	>6,000,000	27,000,000	11,000,000	13,000,000	3,500,000	2,900,000	4,600,000	160,000,000	1,100,000
Fecal Coliform (col/g DWB)	>6,161,137	14,000,000	5,600,000	8,600,000	3,600,000	7,800,000	29,000,000	14,000,000	16,000,000	19,000,000	80,000	12,000,000
Ammonia Nitrogen (% DWB / Total)	2.6 / .0010	2.4	2.5	2.0	2.1	2.3	2.1	1.9	1.9	1.9	2.3	2.0
Total Kjeldahl Nitrogen (% DWB / Total)	5.8 / .0024	5.8	5.1	4.8	4.8	4.3	4.1	4.2	4.6	4.3	5.2	4.7
pH	7.3	7.8	7.7	7.5	7.7	7.5	7.7	7.0	7.3	7.7	7.6	7.8
Soluble Orthophosphate Phosphorous (mg/L)	7.7	3.4	4.9	5.8	6.3	4.5	4.9	11	9.7	10	21	9.2
Total Phosphorous (% DWB / Total)	0.81 / .0003	0.87	0.69	0.68	0.76	0.78	0.75	0.76	0.69	0.79	0.96	0.95
Total Solids (%)	4.2	5.7	7.0	7.9	6.7	7.6	8.3	8.6	9.5	10.9	8.8	9.0
Total Volatile Solids (% DWB / Total)	85 / .0357	82	84	84	80	81	80	78	78	73	85	77
Total Volatile Acids (mg/Kg DWB)	85,000	71,000	55,000	67,000	73,000	67,000	70,000	72,000	69,000	77,000	65,000	70,000

DIGESTER EFFLUENT												
PARAMETERS	1/8/2004	1/22/2004	2/5/2004	2/26/2004	3/4/2004	3/22/2004 *	4/6/2004	4/20/2004	5/4/2004	5/18/2004	6/1/2004	6/15/2004
Total Cemical Oxygen Demand (mg/L)	33,000	54,000	54,000	31,000	36,000	31,000	51,000	47,000	44,000	47,000	53,000	38,000
Soluble Chemical Oxygen Demand (mg/L)	2,600	1,300	2,500	2,900	3,400	3,500	7,700	2,800	3,700	3,400	770	2,400
Fecal Streptococcus (CFU/100 mL)	530,000	17,000,000	720,000	3,300,000	410,000	530,000	170,000	290,000	220,000	370,000	4,200,000	270,000
Fecal Coliform (col/g DWB)	260,000	120,000	86,000	270,000	110,000	96,000	310,000	47,000	15,000	68,000	>30,500,000	38,000
Ammonia Nitrogen (% DWB)	4.0	4.1	3.5	4.3	5.0	4.3	3.7	3.7	3.9	3.1	4.0	4.2
Total Kjeldahl Nitrogen (% DWB)	7.2	7.3	7.2	7.4	7.0	6.5	6.5	5.8	7.0	6.0	7.1	7.8
pH	8.3	8.3	8.1	8.0	8.0	8.0	7.9	8.1	8.4	8.3	8.3	8.4
Soluble Orthophosphate Phosphorous (mg/L)	5.2	2.7	4.5	6.2	7.0	5.6	9.9	7.8	2.8	4.5	1.9	2.9
Total Phosphorous (% DWB)	1.10	1.10	0.97	0.94	1.40	1.30	0.98	0.96	1.20	1.1	1.5	1.2
Total Solids (%)	5.0	4.5	4.6	4.7	3.8	4.4	5.3	5.6	5.3	5.9	5.9	5.8
Total Volatile Solids (% DWB)	79	78	79	79	77	78	78	74	74	74	79	73
Total Volatile Acids (mg/Kg DWB)	4,800	6,000	4,600	7,200	5,400	38,000	120,000	13,000	10,000	36,000	9,300	5,900

Savings

- Bedding Cost
- Fly Control
- LP Gas
- Manure Handlability
- Soil Neutralizing
- Land Base

Environmental

- Green Electricity – Energy
- Phosphorus Nutrient Management
- Greenhouse Gas-Carbon Credits
- Odor Reduction
- Milder BOD Solids
- Bacterial Reduction

Concerns

- Investment
- Struvite
- Physical & Chemical Extraneous Material